

# CHAPTER 11

## PIPE PLACEMENT

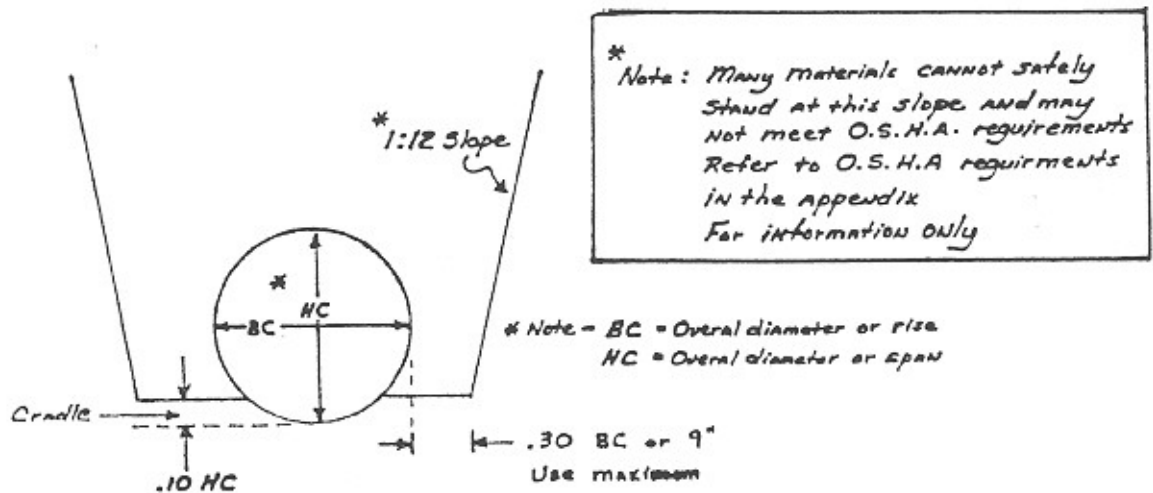
### EXCAVATION

#### Excavation Introduction

Unless otherwise directed, the trench cross sectional dimensions shall be as shown on the plans. The trench bottom shall give full support to the pipe as shown on the plans and in the standards. Recesses shall be cut to receive any projecting hubs or bells on concrete pipe.

The drawings below show some basic trench requirements. These are also shown on Standard Sheets **BKFL**.

#### Cross-section View



#### Longitudinal View



Longitudinal View

**Excavation (continued)** Pipes in fill areas should be excavated only after the fill is to a height equal to the top of the pipe plus the pipe's minimum cover.

The recommended cover, where heavy construction equipment will be crossing the pipe structure is:

- \* Up to and including 18" dia. or equal - 1'6" cover.
- \* 21" dia. or equal, up to and including 54" dia. or equal - 3' cover.
- \* Over 54" dia. or equal - 4' cover.

When the fill height is sufficient to provide the cover listed, it is permissible to place the structure.

**Rock Excavation** When rock is encountered during trench excavation at the flowline elevation the trench bottom shall be excavated at least 8" below the required elevation and backfilled with "B" Borrow to proper grade and compacted to requirements.

**Unsuitable Material** Any time soft or unstable material is found at the required flowline elevation such material shall be removed and replaced. "B" Borrow will provide a stable bed for the pipe structure.

**Excess Excavation Payment** Keep track of cut volumes and "B" Borrow for replacing these soft areas. If the quantity of excavation exceeds 10 cyds, it is to be paid as 3 times the excavation class involved.

**Removal of Existing Structures** Normally, removal of an existing structure is included in the cost of a new structure item unless a special item is set up for it. This removal shall consist of removing existing pipe and headwalls, box culvert and footings to outside the limits of excavation for the new structure.

**Safety** A special concern for safety should always be present on deep pipe trenches. The contractor should have necessary safety equipment present such as safety boxes in deep pipe or sewer cuts and/or sheeting or shoring as directed by safety requirements.  
(See Appendix)

## LAYING PIPE

- Structure Bearing** Each section of pipe shall have full bearing for its full length and shall be placed true to line and grade. Any pipe that does not meet these requirements shall be relaid at no additional cost. No pipe shall be laid on a frozen trench bottom.
- Laying Concrete or Clay Bell Pipe** When laying concrete or clay pipe, the hub or bell end shall be placed up-grade with the spigot end fully inserted into the next hub and with all ends fitted together tightly.
- Pipe joints designed to accommodate seals or pipe joints requiring seals shall be sealed with approved rubber type gaskets, caulking, bituminous mastic pipe joint sealer, elastomeric material or sealing compound.
- If infiltration of water is a factor, each joint, regardless of type used, shall be sealed with an approved compression type joint sealer in accordance with the specifications.
- ABS Pipe** If ABS pipe (plastic) is used, all joints shall be of the solvent cement type and installed according to the manufacturers recommendations.
- Metal Pipe** Prior to placing corrugated metal pipe, the sections shall be checked for proper fit. If sections don't fit together properly, they may be rejected, since they could easily leak. This can be a problem on spiral pipe because some suppliers cut sections to length and end cuts should be checked for square cut. Pipe sections are joined with approved coupling bands.
- When placing riveted corrugated metal pipe, the section laps shall be placed down stream.
- Multiplate Pipe** When placing and assembling Structural Plate Steel or Multiplate Structures, it is very important that the contractor follow the lap of the plate sections as shown on the shop drawings. The shop drawings are furnished by the supplier for proper fit and loading of the pipe structure. Special nuts and bolts may be used for assembly. These may have crowned faces so they fit down into the corrugations. It is essential that the proper bolts are used.
- Refer to the Appendix for a detailed instruction manual on Installation Instructions for Multi-plate assembly for Pipe-Arch.

## JOINING PIPE

**Joining Pipe with Collars** When a satisfactory joint cannot be made, or different types of pipe are connected, or an existing structure is extended, a concrete collar shall be placed.

At the connection of two different types of pipe, the collars shall be at least **18"** wide and **6"** thick.

When joining pipes of different strengths, the pipe of lesser strength than the main pipe shall be incased in concrete at least **6"** thick.

## STUB-TEE CONNECTIONS

**Stub-Tee Connections of different Pipe Types** At locations indicated on the plans or where directed, a stub-tee connection of the size required shall be furnished and connected to the pipe type specified.

### **Metal Pipe**

- The stub-tee for corrugated metal pipe structures shall be long enough to band to connecting pipes. It may be a Band - Type Tee or saddle type tee which is bolted or banded to the larger pipe.

### **Concrete Pipe**

- On concrete pipe, this tee connection can be factory made or field fitted. The stub for the tee shall be at least **6"** long and no more than **12"** in length and shall be secured in place by a mortar bead or a concrete collar.

## PIPE END TREATMENTS

**Introduction** As listed in "Pipe Structures General" there are several different pipe end treatments. In this section we will discuss: pipe anchors, pipe end sections, safety metal end sections and grated box end sections.

**Pipe Anchors** Standard Sheets **MPCA**, **PAHB** and **PASD** show different sizes and measurements for pipe anchors. Pipe anchors are mainly used on larger pipe sizes and are placed to prevent the water flow from undermining the ends of the pipe. Undermining could cause settlement or wash outs.

Pipe anchors are poured in place using class A concrete and are held to the pipe by either anchor bolts or straps.

**Pipe End Sections**

Standard Sheets **MPES** and **PCES** show different pipe end sections that are available in either Metal or Precast Concrete. Metal pipe end sections connect to the pipe by a strap band or a ring type bolt that draws the end section tight to the pipe. These units have a toewall that is placed in a cut trench and backfilled. This toewall serves the same purpose as an anchor to keep water from undermining the pipe.

Precast Concrete Pipe End sections are designed for use on concrete pipe. The inside of the end section is grooved to accept the spigot end of a concrete pipe.

After the precast pipe end section is set in place, an anchor is poured using class "A" concrete. The anchor has hook bolts extending through the end section floor and is secured by nuts and washers.

**Grated Box End Section and Safety Metal End Sections**

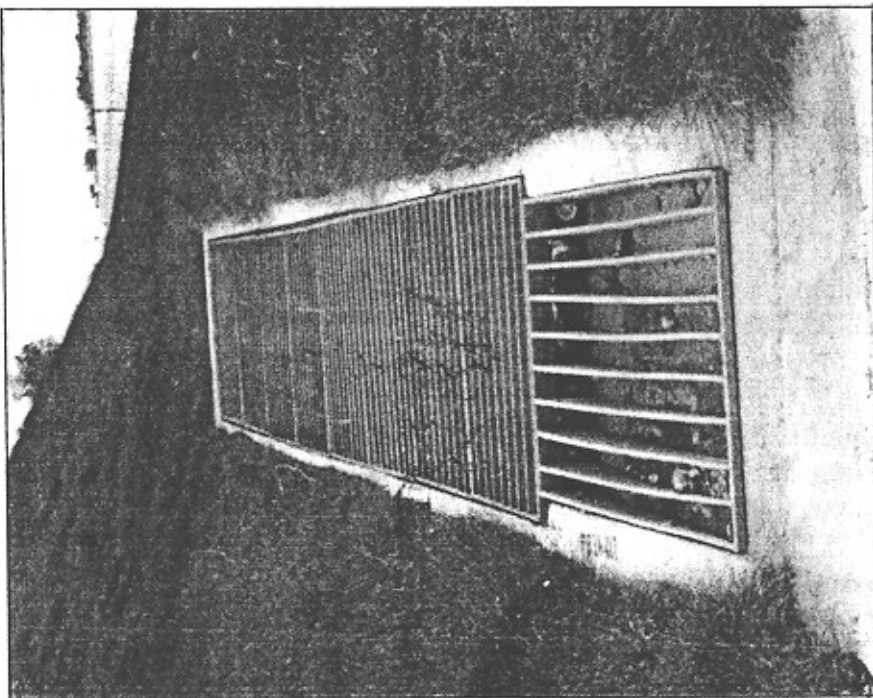
Grated Box End Sections and Safety Metal End Sections are used to provide a safety slope over the structure opening. Safety Metal End Sections are detailed on Standard Sheets **SMES** and Grated Box End Sections on Standard Sheets **GBTO** and **GBTI**. There are two basic types of Grated Box End Sections: **Type I and Type II**.

**GBES Type I** Type I Grated Box End Sections are used on crosspipes under the roadway or other structures perpendicular to the direction of traffic. These units are constructed to the same slope as the embankment they fit into. They have a tubular type grating which will support vehicles travelling across them.

**GBES Type II** Type II Grated Box End Sections are used where the end of a structure would be facing incoming traffic and are built to flatter slopes. These units have a crossbar grating for vehicle support.

Both Type I and Type II units can be either precast or constructed in place. In either case the units are set on a bed of #8 aggregate and the structure is partially backfilled with #8 aggregate. This allows ground water to filter in through weep pipes in the sides of the units. Precast units have a toewall that is poured after the unit is set, using class A concrete.

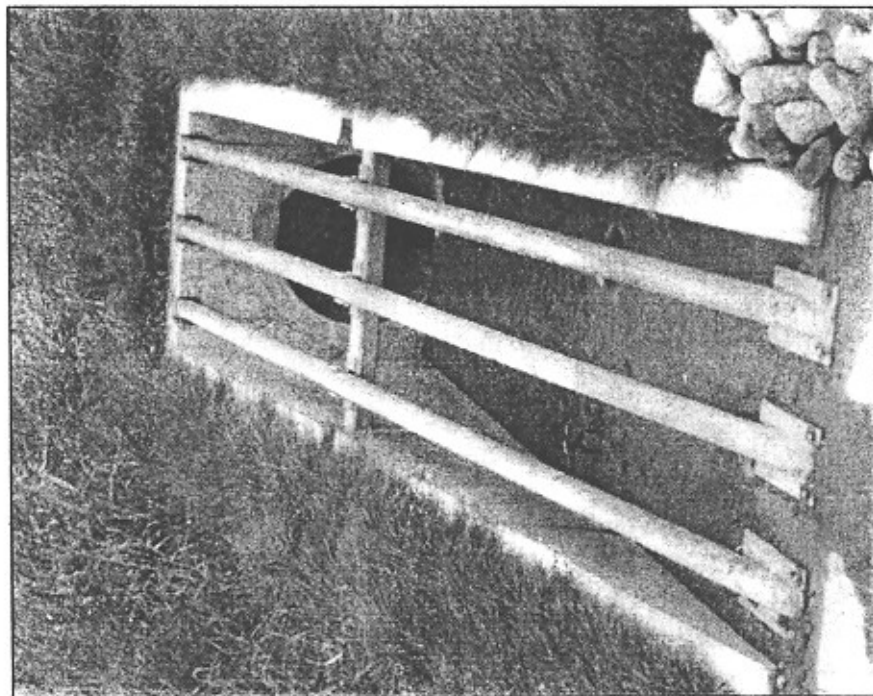
Constructed in place units are poured using class A concrete and reinforcing steel as designated in the standard sheets.



G.B.E.S. TYPE II

(CROSS BAR)

FACING INCOMING TRAFFIC



G.B.E.S. TYPE I

(TUBULAR)

PERPENDICULAR TO INCOMING TRAFFIC